
`recombination.prob` *Probability of recombination out of identical-by-descent*

Usage

```
recombination.prob(centimorgan, num.meioses, chance.descent)
```

Arguments

`centimorgan` vector of distances in centiMorgans
`num.meioses` number of meioses that can happen between two candidate identical-by-descent segments (e.g. 1 for parent-child, 2 for siblings, 4 for 1st cousins, etc...)
`chance.descent` chance that two chromosomes from two relatives are identical-by-descent at a nucleotide position (SNP)

Math

Let d denote the distance between nucleotides in Morgans.

Let m denote number of meioses.

Let $\alpha = \Pr(I_i)$ denote probability of nucleotides being identical-by-descent (unconditional IBD SNP probability).

Let q denote the multi-meiosis recombination function.

$$q(d, m, \alpha) = (1 - \alpha) \left(1 - e^{-d \cdot m / (1 - \alpha)} \right)$$

Note appropriate properties:

$$q(0, m, \alpha) = 0$$

$$q(\infty, m, \alpha) = 1 - \alpha$$

$$\frac{dq}{dd}(0, m, \alpha) = m$$